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The Education of the Surgeon

By

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DEDICATION OF VANDERBILT HALL

Members of the Association have by this time received their invitations to the dedicatory exercises at Vanderbilt Hall, the dormitory of the Medical School which has come into existence through their interest and finally through the generosity of Mr. Harold Vanderbilt. The dedication will take place at 4:00 P. M. on October 14, the address of the afternoon being delivered by Dr. George E. Vincent of the Rockefeller Foundation. In the evening the Alumni Association will be hosts at a dinner in Bowditch Hall with Dr. Edsall and Mr. Vanderbilt as speakers. Dr. Truesdale, as president of the Association, will preside.

As many of the Alumni will undoubtedly come from a distance, Dr. Edsall wishes to announce that quite a number of rooms will be available in the Dormitory, and in so far as the Alumni can be cared for in the Dormitory the School will be very pleased to have them as its guests. It will, of course, be necessary

to notify the Dean's office in advance in order to have the rooms necessary.

About 200 rooms in the Dormitory have already been assigned to students, but aside from simply furnishing living quarters the Dormitory will provide a social centre for the entire School. Bowditch Hall, the great dining hall, has already started providing meals to students and faculty; the gymnasium, Mr. Vanderbilt's original gift, occupies, with its squash courts, one wing of the building; there is a students' room named after Charles Best, and a large living room, the centre of interest in which will be the portrait of Samuel Jason Mixer, given by the Aesculapian Club. About forty-three of the students' rooms have been given as memorials to physicians who have served their communities well; most of them are graduates of our School.

The dedication of Vanderbilt Hall marks a distinct forward step in medical education. The exercises will be impressive and the occasion a notable one. The building itself will well repay inspection. No Alumnus who is able to be present can afford to stay away.

THE EDUCATION OF THE SURGEON*

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I am grateful for this opportunity to speak to you this evening because it allows me to add my personal thanks to the Faculty vote which acknowledges your generous action in welcoming to your family the various members of the teaching force who are sons of other universities. Nothing can be of greater importance to a university than the welfare, success, and happiness of its graduates, for they reflect the character of the school from which they graduate, and it is their influence in the communities to which they travel by which others measure the desirability of their Alma Mater as a school to which possible candidates of their selection might go. You, therefore, represent the measuring rod by which others shall judge your school, and though you have no active vote you must be quite as interested as members of the Faculty in new acquisitions to the teaching force, for your own reputations are invisibly affected by the kind of teaching which continues in your school. If the succeeding classes are well taught and become satisfactory physicians and investigators, the laity will come to look more favorably upon your school and all the graduates will be insensibly benefited. Likewise, if we as teachers fail, you will to some extent lose caste.

It is the custom in most of the continental universities that an incoming professor in taking over his chair shall give an open address to the faculty and

friends of the university to which he has been called, in which by custom he devotes himself to a discussion of the status of his special field at the time he takes up his duties, and in which he also discusses the promise of his field in the future, in what directions investigations of importance may be expected, what his own particular special field within the broader outlines of his activities may be; and often the incumbents of chairs have chosen to illustrate these matters by a recital of their own particular education. Thus, in the inaugural address of René Leriche, the new Professor of Surgery at Strasbourg, he depicts in an interesting fashion what he thinks has been of importance in his own career, what teachers, and what influences have been strongest in directing his efforts into special fields, and he ends up by outlining in a brilliant fashion something of what he hopes the future of surgery may be like.

There is not the opportunity now for any such formal undertaking, but, as graduates of this school, you must be interested in what particular lines of thought new incumbents to your Faculty are particularly interested. I have chosen as my topic "The Education of the Surgeon," and though I have tried to make it a quite impersonal matter, doubtless what will appear is tintured by my own particular experience and education to the same extent as all mortals are influenced by their own particular environment.

It is proper to state that education like clothing is somewhat a matter of fashion and runs in cycles, now long, now short, now bedecked with much show and many frills, again reduced to almost naked simplicity. Medical education differs but little from other

*Address before the Western Reserve Medical Alumni Association, Cleveland, June 14, 1927.

forms of education except that since it has a prime utilitarian aim, the care of the sick, it demands practice. Surgery is perhaps more fortunate than its esteemed partner, Medicine, in that it is almost purely utilitarian, has less time for philosophy and, therefore, even from its earlier Barber days has found it simpler to avoid the larger fluctuations of educational fashions. Moreover, mistakes in surgery may cost the patient his life, whereas a little more or less rhubarb or jalap hardly does more than hasten the step. Thus, we have always found surgery, which practices through the hands, studying the matter it must handle, i.e., the body, with especial diligence. Anatomy became the cradle of the surgeon.

This matter of anatomy was particularly urgent in the pre-anaesthetic days for only the skilled anatomist could remove a leg in the few seconds permitted and be ready for the control of bleeding as the immediate occasion arose. It is true that with the introduction of anaesthesia the prime reason for this haste disappeared, though even today we see spectacular surgeons who, oblivious of the damage caused by their swiftness, still sweep through the day's work as though the headless horseman of Sleepy Hollow were indeed at their heels.

Slowly the blessing of anaesthesia wrought its effect, and now, eighty years after the introduction of ether, surgeons are beginning to appreciate the value of a study of function. Moreover, anaesthesia has permitted experimental surgery upon animals, and though this type of work was begun by special workers who are now called physiologists, surgeons themselves have at last entered this field with vigor and enthusiasm. But matters other than physiology have

led us away from the dissecting room. The single principle of hemostasis upon which surgery previously rested has been amplified by the work of Pasteur. Bacteriology is now a matter of prime importance to the surgeon; in the words of Arthur Tracy Cabot "every surgical operation is an experiment in Bacteriology." The explanations for our surgical failures are to be found in the bacteriological and physiological laboratory more frequently than in the anatomical rooms.

These matters have brought the mediciner and the surgeon closer to each other. They find their language has much the same brogue, that their interests lie in the same directions, and that there are no possible divisions of disease, one medical and the other surgical. From time to time this second marriage, in spite of the long interval since the happy unification of Hippocratic days, shows healthy rumblings. The surgeon and the physician cannot agree on even such simple matters as peptic ulcer or Graves' disease. If the surgeon hear his colleague lecture to the students on brain tumors for which the latter can do nothing, he may well raise his eyebrows; and when the surgeon, led to his topic by his interest in the operation of splenectomy, talks about non-retraction of the clot, the bleeding-time, or the platelet count in thrombopenic purpura, the physician may well be scandalized.

But in spite of these rumblings the marriage is not only happy but productive. And while the children are being born, both parents are experiencing, as those of us who have children know by bitter trial, a second and most liberal education. It is an old proverb that two heads are better than one, but in no matters of life is it of greater signifi-

cance than where the problem is suffering humanity. Such is the environment into which our embryo surgeon is born. It is a fortunate one, and he is doubly fortunate in that the modern fashion of education to which he is to be submitted calls for emphasis on essentials, less talk and more practice.

UNDERGRADUATE EDUCATION

We must begin with the medical student, for we have no choice and no control over earlier educational facilities. We may well wonder why the student's preliminary education has been chiefly devoted to matters that train only the memory since this is the simplest form of intellectual exercise. We may well regret that almost no training has been had in increasing the student's powers of observation or in comparison and the synthesis of ideas, or in the development of independence of mind and thought. In the four years of medical school work we must see to it that the student is given a general medical education. Our aim should be to graduate safe practitioners of medicine. Great effort should be placed upon presenting clearly the general field of medicine as a unified matter. Basing clinical instruction upon a clear understanding of normal structure and function, we should be sure that the students are first made familiar with the more common ailments. In the brief time at our disposal it is quite impossible to demonstrate to each class every form of disease, and indeed we should not turn out as safe doctors if we did so, since if all the time is taken up with reviewing clinical variations of disease we shall spend all our time in this fashion and will fail to educate our students because of our desire to give them so much information. It is quite impossible to

show all forms of disease to the students, but if we take special plans in inculcating principles to the classes and especially in drilling home the value and use of the various methods for determining disease we shall have served our purpose well.

To teach medicine from the point of view of giving to our students an education rather than a mass of indigestible information is quite a different matter. If we adopt the education point of view, clinical training will rest more firmly on the preclinical sciences. Epidemiology and public health matters rest squarely upon a proper training in bacteriology. The care of a septic wound, if intelligently carried out, is merely a clinical example of immunology and pathology, and every surgical operation is an experiment in bacteriology. Thus, those intrusted with the instruction of medical students must have a thorough appreciation of the basic medical sciences and must correlate the student's preclinical training with his daily clinical experiences. It pleases the students immensely to be shown in a clinic devoted to sepsis several cases of carbuncle, abscess, lymphangitis, cellulitis, septice-mia, pyaemia, wound infection, etc., but I question whether such a kaleidoscopic mass of material will serve so well to educate the student's ability to care for his patients in the future as an hour devoted to an intimate discussion of the immunological and pathological aspects of the reaction in a single case. In devoting an hour to a single case both the general and local defense mechanism can be pictured with the obvious corollary of how best to assist these natural protective powers. If the infection is severe, the matter of damage to other organs distant from the site of infection can be covered, and the responsi-

bility of the student sharpened by being shown that possibly acute nephritis or multiple bone or joint disease can result from improper treatment. Such thorough discussions tend to increase the student's reasoning ability as well as whet his appetite to know more. He even may reach that pitch of curiosity which leads him to inquire further into the matter by turning the pages of a book. Once a young man is trapped into this frame of mind, his education is assured.

There must be no effort made towards specialization in the school years except in so far as specialists can best teach certain matters of general importance. All students no matter what their future course should receive the same instruction. Specialization is a postgraduate affair and is best acquired only after at least one year's general hospital training. I dare not speak of the medical specialists, but in the field of surgery it is certain that those who have done most in medicine, both as regards their own success as well as their gifts to our profession, have been those who have elected their speciality only after a general surgical training. Lovett in orthopaedic surgery, Cushing in neurological surgery, and Hugh Young in genito-urinary surgery were all well trained and competent general surgeons before they commenced their work in their specialities, and it is perhaps true that the greatest gifts to the field of general medicine in these cases were made by these individuals when they were still fresh from their general training and intimately associated in a general hospital with the general surgical service. Their reputations have been greatly augmented by the mass of work in their special fields but the real steps which led to all this were made long before they had become iso-

lated in their speciality. In searching our historical background we shall see that usually the forward steps have not come from special institutes which merely represent a reward for accomplishment but from general hospitals and from men who at that particular time were not yet considered specialists.

In this general medical education matters of diagnosis will assume a dominant rôle. Unfortunately our medical schools have long laid such stress on this that matters of therapy have been neglected. As an indirect result of our failure as teachers properly to suggest and teach therapy, the laity have easily fallen prey to various special therapeutic measures that have been developed by non-medical individuals. There can be no doubt but what the flourishing condition of the special systems of therapy called Christian Science, osteopathy and chiropractic is in part due to the failure of our profession to emphasize properly the interrelation of mind and matter and the use of mechanical means of therapy. We need not be introspective over our failure along these lines, for quackery and miracle healing have always flourished and are in line with P. T. Barnum's famous remark that "the public likes to be humbugged." However, we should take warning and be more specific in our therapeutic teachings.

In presenting the disorders of the clinic to students, the department of medicine should play the chief rôle, though there will be many diseases with which the surgeon is more familiar and therefore justify his presenting these matters. Such teaching, however, except for the field of trauma and sepsis will be chiefly diagnostic, and, though therapy may be suggested, there should be no time wasted on surgical technique and operations.

It is true, however, that every medical school must equip its graduates with enough technical training to insure the proper care of the common clinical manifestations of trauma and sepsis. A general practitioner who cannot set a limb, care for a spreading or a localized infection, control hemorrhage and give an anesthetic is a sorry sight and an unfortunate reflection on his medical Alma Mater. The principles of surgery are entirely covered in teaching the proper care of trauma, hemorrhage, pain and sepsis. What further instruction is given should be along strictly educational lines, giving to the student a glimpse of the various conditions that are amenable to surgical therapy. No pretense need be made to instruct the student in the actual surgical procedures, but it will be necessary to illuminate this part of the teaching with cases in order to point out the practical value of the advice given.

The form of curriculum in use in most of the medical schools of the United States is based on the simple principle that normal structure (anatomy, histology, and embryology) and normal function (physiology, biochemistry, etc.) are taught in the earlier years together with a description of common agents injurious to the body (bacteriology, parasitology, etc.) and also the end results of such injurious agents (pathology). In the last two years the student moves into the clinic where he studies the alterations from these normal levels which are recognized as diseases. Between his studies of the normal and the abnormal are sandwiched courses which are arranged to equip the student with the methods by which we recognize these deviations from normal, viz., the physical examination, the elucidation of a proper history, blood counting, urinalysis, and

all the topics commonly covered in clinical pathology. In surgery there must also be a practical introductory course in which the principles of surgery are thoroughly covered in order that when confronted with a patient the student may have at least an idea of what to do. If the teaching of the principles of surgery is left until patients are treated, much is lost by the student's interest (thoroughly commendable) in the patient which will surely detract from his learning the lesson which lies behind the actual case. These courses are perhaps the most valuable applied medical course the student has, because after a pupil is well trained in methods, he can apply those methods without much assistance and can thus rapidly broaden his medical education by his own efforts. Unfortunately, these introductory courses are commonly assigned to junior instructors and are given an insufficient share of the time devoted to the departments responsible for this teaching.

There are four major clinical departments in the School of Medicine at Western Reserve University,—Medicine, Surgery, Obstetrics and Pediatrics. The various specialties of Medicine and Surgery fall under their respective major departments. At present the Departments of Obstetrics and Pediatrics are housed in separate hospitals adjacent to the Medical School. Fortunately, the contemplated removal of the larger general hospital containing the Departments of Medicine and Surgery to the Medical School campus though long delayed is about to be consummated. This physical separation has been unfortunate, for schools will rarely attain great success where the teachers themselves are obstructed from the most intimate contacts with their colleagues. The Professor of Medicine needs the advice and assistance

of the Biochemist and the Pharmacologist quite as much as the Professor of Surgery the aid and stimulation of his colleagues in Anatomy and Physiology. Moreover, such a physical separation tends to increase in the mind of the student the natural feeling that his preclinical and clinical years are separate and distinct entities.

There is not the time to discuss here matters of curriculum, but a short synopsis of the type of course given is necessary in order to appreciate the status of the special education of our embryo surgeon by the time he graduates. This special education in surgery begins in the second year when a course of eight lectures and sixty-four of laboratory work are outlined in an attempt to give to these students an introduction to surgery and a basic appreciation of the principles which underlie this means of therapy. I consider this to be the most important course given by the Department of Surgery and I have personally shouldered the responsibility for the lectures and have insured an adequate and carefully chosen personnel to conduct the laboratory courses. The introductory lecture is used to give the students an historical background and special effort is made to tell students that there are no sharp lines and divisions between medical and surgical disorders. The necessary text-books are suggested, and an attempt is made to stimulate the students into frequent perusal of medical journals. All students are asked to read at least one medical biography and the lives of Pasteur, Paré, and Sir James Paget are suggested as the most interesting and instructive. An attempt is made to instill a high responsibility toward their profession, and they are particularly cautioned about discussing either cases or laboratory work in public. The prin-

ciples of surgery, which are those methods by which we avoid pain and sepsis are covered in the succeeding lectures. There are also lectures on anaesthesia and wound healing, particular emphasis being laid on the value of a knowledge of bacteriology, immunity, physiology, anatomy, and pathology. Every effort is made to demonstrate to the class the value of their preclinical training in its application to clinical disease. Thus, in the lecture of trauma and sepsis the methods which assist in the mobilization of antibodies are elaborated not as didactic facts but in relation to their previous training in pathology and bacteriology. These lectures are amplified, visualized and put into practice in the laboratory course. In the first part of the course the students are divided into operating teams and do everything that is required of the different members of an operating room team in operations upon animals. This course is set up not to teach surgical operation but to be a lesson that will make the students appreciate the principles of surgery, and is chiefly of assistance in demonstrating methods of asepsis, antisepsis, and anesthesia without which no doctor can successfully practice general medicine.

Later on in the course two weeks are devoted to surgical pathology and the time is almost entirely given to a study of wound healing. We are always anxious to get away from didactic methods and rather than train our young surgeons by orders we wish them to see all the reasons for the steps that take place in the surgical service. A study of the healing of a wound allows the young surgeon to appreciate why people are allowed to get out of bed on the fourteenth day. He has already seen for himself under the microscope what different kinds of wounds, infected and sterile,

closed with silk or catgut, look like at the end of given intervals, and when he is told to get a patient up on the seventh or eighteenth day it is not a simple order to be remembered but will serve to recall to him his own work and it will be unnecessary to explain later on why this order was given.

The last part of the course is devoted to practice in bandaging, in the use of apparatus, splints and plaster of Paris. This period of instruction emphasizes the benefits to be derived from support and immobilization, and here again the relation of the instruction to immunological facts already ascertained is brought out.

In the third year a lecture a week covers the entire matter of regional surgery. Each week the topic of the lecture is amplified and emphasized by clinics at the several hospitals controlled by this medical school. In addition to this course there are lectures in the different surgical specialties and the class is broken into small sections which attend the various dispensaries so that the students have actual contact with sick people and begin to learn practical methods and to apply their previous instruction.

In the fourth year the students attend the hospitals as clinical clerks where they act as junior internes. Here they have a real opportunity to study diseases at first hand and no part of their training can be more important than this, except perhaps when they are learning to appreciate methods of study in their second year. Their contact with the staff is daily and intimate. They work up their cases fully. They are allowed to assist at operations, and they are encouraged to read the literature in relation to the case they happen to be handling at any particular time.

It has been our hope for some years

that, in order to encourage thoroughness, each student be made to follow during the year at least ten cases after discharge from the hospital and write a careful follow-up note on the case, their duty with these patients ending when the patient returns to work. This would, in addition to thoroughness, point out the real results of surgery, teach the students the importance of after care, and open up to them an avenue of study of lasting value.

The weekly staff meeting, at which all the material removed at operation the preceding week is discussed, seems to be a function of great importance. Without the necessity for direct criticism it resulted soon after its initiation in a considerable reduction in the number of operations with negative findings. Let us use for an example the classical case of so-called chronic appendicitis. At this meeting histories are rigorously questioned and examinations suggested. The presence of the students at such a meeting is not only beneficial to them but to the staff who hardly care to have their mistakes discussed before such junior men. Thus, again the presence of students tends to greater safety for our patients.

Accessory instruction in X-ray and anesthesia occurs during this period. Each student is expected to give at least six anesthetics during his month's service. One afternoon each week two students in each section go to the X-ray department where they see in detail fluoroscopic diagnosis.

This amount of schooling, carefully carried out and rigidly adhered to, should equip the student with a broad outlook on his profession and a knowledge of the limitations and advantages of surgery. Though it has given him as a surgeon no particular training in tech-

nical details, it allows him to view the possibilities of surgery and should make it clear to him in his practice what type of case should be referred to this form of therapy.

The above outline not only depicts more or less what our particular students in this school have in the way of surgical education during their undergraduate years but also is a fairly good example of the general trend of undergraduate surgical education in the best American medical schools. When we are through with all this, however, we have educated our student chiefly in matters of diagnosis and have only suggested to him what disorders may be amenable to surgical therapy. We have tried to inculcate in the young man something of the principles which underlie good surgery. We hope we have taught him how to treat simple trauma and infection. We hope too that we have taught him how to give an anesthetic, but we have all along been greatly more interested in developing the student's mind and in teaching him how to search the literature in order that he may unravel difficult problems which are bound to come to him in the future. We have tried to equip him with high ideals and a fine sense of responsibility toward patients, but we have not attempted to train his hands in the art of practical surgery. This is a matter for post-graduate education.

POST-GRADUATE EDUCATION

Thus, all the clinical departments in the years of undergraduate instruction should be imbued with the common purpose of turning out safe, general practitioners of medicine. When the student has obtained this general training, he may elect an internship on a rotating system which allows him further general experience with disease and also some

practical training in the various special forms of therapy, or he may even choose to spend a year on a service restricted solely to medicine or to surgery. This matter of the internship training has long bothered students, and probably will continue to do so. It emanates partly from the fact that services vary so greatly in different hospitals. It appears to me that, in university hospitals where teaching is a matter of chief importance, there is little difference in the medical and surgical services, except that on the surgical service after the studies have been completed we usually have an operation. A good deal of the material is quite similar; gastric and biliary disorders, pulmonary, cardiac and renal disease, diabetes, and even exophthalmic goitre are found on both services. The studies made are equal on both services. Gradually we are breaking away from the barber-apothecary stage of medicine, and disorders are no longer spoken of as surgical or medicine but as disorders of the brain, lung, stomach, or heart. Special tests such as spirometry, perimetry, electrocardiography, etc., are no longer the adjunct only of the mediciner, because any intelligent person can master them and no intelligent surgeon will operate without competent studies and a full appreciation of the underlying pathology. Fields for work and specialization are no longer dictated by apparatus and instrumentation but by the individual's interest in an organ. The finger of change has already pointed this out, and physicians who have done their own surgery, as have Brauer and Jacobaeus, are in line with surgeons who do their own diagnostic studies. One might even venture further developments along this line and suggest that in the future the genito-urinary surgeon who already uses blood chemistry in relation to the function of the kidney more than the medic-

iner will be the logical person to treat nephritis. After all, he is the one devoting his life to the study of this organ and he alone is familiar with the technique for differentiating the function of the two kidneys.

But we must return to the Surgeon. Surgical practice differs from medical practice in that it demands elaborate technical training. This training requires at least four to five years of close application and can only be attained by practice under a competent master. This means apprenticeship and automatically prevents teaching by the class and group method. It is an individual affair and no master can train more than a small handful of pupils at any one time, no matter how much material is available. The training of a surgeon is thus a post-graduate activity. Because of this, professors of surgery find that their greatest interest lies beyond the undergraduate surgical curriculum. All teachers must wish to propagate their kind, and it is only in the years after graduation from the medical school that the surgeon can educate his disciples. It is indeed unfortunate that all those who practice surgery do not have such a training. In the case of those surgeons who do not have the opportunity to obtain their experience in this fashion, it means that their training is achieved by individual effort often undirected and at the expense of society. Although some individuals have more aptitude than others, good surgery demands practice and it is safer and saner to obtain this under guidance than by the law of unaided trial. It is to be sincerely hoped that in the future new regulations will be drawn up which will make it necessary for a surgeon to pass a special examination and to show special credits before he can practice surgery. The

present laws which permit any doctor to conduct a surgical operation are a menace to the public and show no sensible knowledge of the wide variations within the domain of the practice of medicine. Surgery is a special form of therapy which, unless adequately practiced, demands a heavy price in both life and disability. Moreover, since in surgery financial rewards are greater, it is quite proper that a larger and special training should be demanded of those who would practice it.

The next age of the surgeon will be his hospital career. This may require anywhere from three to six or seven years. If he is wise, I think he will try to tie himself to an individual under whose wing he will work more or less continuously throughout this period. Young men who flit about from hospital to hospital never get settled long enough to acquire the technical methods which a single master might teach them did they stay long enough, and they certainly do not stay long enough to arouse in their chief the interest and personal relationship without which no master can give the best to his pupils. These years of hospital training will begin with an internship and for at least a year the young man will be chiefly an onlooker as regards the education of his own technical abilities, but when he graduates from his internship to the post of assistant resident surgeon greater responsibilities will be placed upon his shoulders. He will begin to perform alone surgical procedures, at first under close guidance, but later, when his superiors have found that he has intelligence and will call for others when matters are alarming, he will become a more or less independent worker.

These are critical times for the young surgeon. A surgical operation is not

like a medical examination. It benefits chiefly the one who operates; whereas in the examination of a medically sick patient ten people may go over the patient and receive the same amount of instruction. This is the most important argument for the necessity for a larger number of beds for a surgical as compared to a medical service. The cases which are to be handed down to the young surgeon should be carefully selected, and particularly they should never be left to operate alone upon a critically ill patient. To have a death occur in the hands of a young surgeon early in his career not only is a criticism of the senior people who allow this state of affairs to arise but may do the young man great harm, for it will permit him to think that such an outcome is a necessary and expected incident in the career of a surgeon. This is unfortunate, for young surgeons should be brought up with such a high sense of responsibility that a death occurring to one of their patients looms as a terrible disaster. It is quite as important to educate the psychology of the young man as his fingers.

After perhaps two or three years we shall find this young surgeon operating with splendid technique and performing the routine and simple procedures with great skill. At this period in his life he must make his choice as to what his future is to be. Is he to go out into the practice of surgery or has he acquired such a real curiosity for the truth that he is willing to sacrifice something of the financial returns of life and remain a student for the rest of his life? If he is to choose the latter and remain in a university career, his education must be carried along somewhat different lines. In this case he had best be placed in an experimental laboratory for a period of at least a year. This is done not so much

that he shall turn out a great and famous piece of work but for general educational purposes. In the first place he must learn laboratory methods and proper use of controls and what a critical experiment consists of. He cannot in the future help his assistants with such problems unless he has had such training himself. In the next place he must learn to think for himself. Heretofore there have always been others at his elbow to urge him on and give him ideas or even put the words which he uses into his mouth. Now he has really become a man, must stand on his own feet, speak his own mind, have his own ideas, and take a place in the intellectual world. There must be in this year plenty of time for reflection and study, and this year is often to the young man his hour of sorest trial, for he is suddenly taken out of a busy, forced existence where critically ill and suffering people have dictated his every move, and he finds himself with no pressure behind him and, as it seems to him at first, with almost nothing to do. It is extraordinary how lost such a young man really is and here the greatest delicacy in his handling must be shown. He should be allowed to think it over for a long period of time, and but little assistance should be given him. Usually young men under such treatment become introspective and almost morbid, but before this travail goes on too far they must again be picked up, stimulated, and set out on an interesting problem. Once this promontory has been safely passed they begin to develop with amazing speed and nothing is of more interest than the observation of this period of a young man's life. There are further things to be learned in this year because the young surgeon will now find that he is in charge of the activities of others. He must arrange

the time of laboratory dieners and see that supplies are on hand, and also that one has to set up a show after all in order to have it run. This small training in administrative matters is of the greatest importance to the man who is to enter a university career and, though it seems small, it has in some places been the turning point of more than one individual. The problem upon which he has worked may have proved most fruitful so that perhaps he is willing to spend another year doing the same thing. It is certain at any rate that the young surgeon will acquire a thoughtful, critical attitude, he will know how to handle himself, how to arrange and run a laboratory, how to set up a critical experiment, he will become familiar with the literature, and the world from now on will look quite different to him.

The exact use of this laboratory year, and its spacing in relation to the education of the surgeon, will vary according to the individual's previous training and opportunities. In the past such a year was often given over to anatomical work. Now it is perhaps best devoted to work in a laboratory of experimental medicine and surgery. However, the laboratories of the pathologist, the physiologists, the physician and the surgeon differ but little now-a-days, and the chief influence in attracting young men will be the personality of the individual in charge and the special requirements of the candidate. Medical and surgical practice rests squarely upon pathological physiology and, if the student's training in pathology has been inadequate, all other considerations should be set aside and he should betake himself to a pathological laboratory. The demands will vary in each case. In my own experience having already had a year's training in pathology I elected to work with Dr.

Flexner on a problem in immunology, not because I had any intentions of becoming an immunologist but because I wished to get away from the clinic and needed to train myself in quantitative and accurate methods under a critical master. Also I realized that I must have a fuller understanding of the processes of nature by which man protects himself from disease. In another instance where such training is already adequate another type of work should be elected.

The next step in our young surgeon's career will be his elevation in the hierarchy of the university service. He will perhaps become the resident surgeon who is the immediate go-between of the chief and the staff; his opportunity for greater operations and greater responsibilities will be at once immensely enlarged and in the next two years he should be able to complete his training as a surgeon. Thus we shall find this young man, after five or six years out of medical school, an expert surgeon. He operates with a meticulous, gentle, sure, and well understood technique. He has learned to handle patients, to keep internes happy, and to satisfy the demands of a staff who often act with the independence of thought of a troupe of opera singers.

But his training is still incomplete if he is to accept and go on in a university career, for he has not yet had sufficient experience in teaching. I am not foolish enough to think that one can make a teacher any more than I think one can make a surgeon, for people with certain attributes which are necessary for the practice of these difficult professions are born with them and though they can burnish the gift they cannot make it appear when it is not there. Students are stimulated by enthusiasm and are led by

a fine precept and example rather than by the spoken word, and though perhaps this is a difficult matter to acquire something can be learned by practice. Beginning by giving a course of instruction to nurses, by helping out with the teaching of clinical clerks, and finally by being given the responsibility of some clinics and a laboratory course, our young assistant will begin to see how elaborate the whole thing is, will perhaps determine for himself into which corner of this structure he will himself best fit and may now, with some experience in teaching, decide to specialize in one of the surgical specialties.

Thus we have covered what the possibilities are in the education of the surgeon. It is a laborious pathway. It is one that needs constant guidance and those who are to teach others must hold in their minds quite as much the psychology of education as the far more simple technical teaching. And finally if one can really teach one's pupils the simple principles of surgery they can operate on any part of the body with impunity. Patients who do not get infected and do not bleed will recover. It is really quite simple if one does not hurry. If they do not bleed they do not need transfusions because transfusions in a normal individual merely over-burden the circulation. Indeed it is well perhaps in a surgical clinic to be over-meticulous about such matters, and it is an unwritten rule that when postoperative transfusions are necessary in the surgical clinic at Lakeside Hospital, unless there have been competent preoperative reasons, I personally would like to have an explanation of why they should be given. If the blood volume was low before operation, the transfusion should have preceded the operation; if it was normal before the operation and low

afterward, there was a mistake in surgical technique.

When I was a medical student, Maurice Richardson was Professor of Surgery, and I recall his telling the class toward the end of his career that he did not think that he operated with any more facility and dexterity at that time than he did four years after graduation from medical school. This was perhaps an over-statement, but it is a matter with which all surgeons will agree, for though we can teach the technical training in a period of four or five years, the matters of judgment, of how to handle people, and of where and how to learn to unravel unusual matters are quite another story. These latter are the necessary corollaries to experience, to much thought and to a life devoted to painstaking sense of responsibility regarding the lives of our patients.

THE CARE OF THE PATIENT

The lectures on "The Care of the Patient" that have been carried out each autumn for the past two years have been arranged for this year according to the following schedule.

- Tuesday, October 18th—Dr. Edsall.
- Thursday, October 20th—Dr. John M. T. Finney.
- Tuesday, October 25th—Dr. Austin M. Riggs.
- Thursday, October 27th—Dr. C. Macfie Campbell.
- Tuesday, November 1st—Dr. Charles F. Martin.
- Thursday, November 3d—Dr. Alfred Worcester.

It will be noted that there are three distinguished men from elsewhere who will speak this year—Dr. John M. T. Finney, Professor of Clinical Surgery

